

STEREO MOC Status Report  
Time Period: 2016:312 - 2016:318

STEREO Ahead (STA) Status:

1. The following Ground System anomalies/events occurred during this reporting period:

- On day 317, during the DSS-24 support, turbo decoder lock was lost briefly at 2051z and again at 2129z. This anomaly resulted in the loss of two frames of SSR data.

2. The following spacecraft/instrument events occurred during this week. The Ahead observatory operated nominally during this week.

- On day 317, the PLASTIC SSR science partition (#17) filled and began overwriting at 1028z for 8.7 hours due to an unexpected shortage of track time.
- On day 317, the SWAVES SSR science partition (#13) filled and began overwriting at 1330z for 5.6 hours due to an unexpected shortage of track time.
- The average daily science data return for Ahead was 4.8 Gbits during this week.

STEREO Behind (STB) Status:

1. The Behind loss of communication anomaly occurred on October 1, 2014. Post superior solar conjunction, recovery operations resumed on November 30, 2015. By implementing the NASA Failure Review Board recommendations, the first recovery attempt began with carrier detection by the DSN on August 21<sup>st</sup>, through September 23, 2016. At a spacecraft range of ~2 AU, the observatory was found to be rotating slowly about its principal axis of inertia for which the uncontrolled attitude allowed some solar array input and continuous uplink and downlink communications on the LGA at emergency data rates. Over the next 22 continuous days, significant obstacles to recovery were overcome with a collaborative effort of the JHU/APL engineering team, NASA GSFC, DSN, FDF, SSMO scheduling, and Mission Operations teams. This consisted of:

- Reliably commanding a rotating spacecraft with uncontrolled attitude at a distance of 2 AU
- How to power on the spacecraft that was never designed to be off without collapsing the battery voltage
- Acquiring telemetry at 35 bps from a spacecraft that is rotating with an uncontrolled attitude
- Warming a frozen propulsion subsystem with a degraded battery and limited solar array input with an uncontrolled attitude
- Configuring, loading, and verifying EA, C&DH, and G&C parameters and macros with very limited telemetry
- Conducting an autonomous momentum dump in the blind and transitioning to C&DH standby mode and successfully receiving telemetry on the HGA indicating star tracker lock and decreasing system momentum.

However, system momentum level remained above the threshold for re-establishing attitude control with the reaction wheels. Due to the uncontrolled attitude, communication degraded and the last detection of the carrier was on September 23<sup>rd</sup>.

Behind Observatory Status - From the last telemetry received on September 18<sup>th</sup>, main bus voltage is low, 2 out of 11 battery cells are currently not functioning, attitude remains uncontrolled, rotating at a ~45 second period about its principal axis of inertia. While propellant is suspected to be frozen, last telemetry indicated both propulsion tank latch valves are open and pressure transducer #2 is not functioning. EA mode is enabled. The battery charge rate is C/10. Necessary macro sequences have been tested to allow the peak power tracker in C&DH standby mode to protect the battery. These macro sequences will be loaded to EEPROM when the communications supports longer commands.

Monthly recovery efforts consist of attempting to power on the transmitter for 30 minutes. If no carrier signal is detected, battery recovery operations will commence which consist of repeatedly sweeping a 3 kHz uplink range and sending commands for IEM switched power and PDU 1553 interface bus off.

2. Detailed status of the recovery activities this week to restore operations are listed below.

- On day 316, during a 4.5 hour support with the 34m station DSS-26 using the 80 KW transmitter to minimize 70m contentions, 480 commands were transmitted during the

support. No carrier was detected by the DSN after attempting to power on the TWTA for 30 minutes. Transitioned to battery recovery operations which consisted of repeatedly sweeping a 3 kHz uplink range and sending commands for IEM switched power and PDU 1553 interface bus off.

- On day 318, during the DSS-26 support, the transmitter tripped off shortly after BOT at 1606z. The station was unable to resolve the issue prior to EOT. Of the 380 commands that were expected to be transmitted, only 13 were radiated before the transmitter tripped. Since the transmitter high voltage on command was not sent, there was no chance of detecting a carrier signal during this support. See DR #G117611 for more information.
- On day 318, during a 2.6 hour support with DSS-14, 280 commands were transmitted during the support. No carrier was detected by the DSN after attempting to power on the TWTA for 30 minutes. Transitioned to battery recovery operations which consisted of repeatedly sweeping a 3 kHz uplink range and sending commands for IEM switched power and PDU 1553 interface bus off.